

What is claimed is:

1. An apparatus for attaching a ground-engaging tool to an implement frame of an implement adapted to move along the ground in an operating travel direction, the apparatus comprising:

a frame bracket defining a pair of laterally spaced parallel cylindrical bores,
5 the frame bracket adapted for rigid attachment to the implement frame such that the bores are oriented substantially upright;

a pair of cylindrical shafts, one shaft slidingly engaged in each bore such that the shafts are maintained in a parallel, substantially upright orientation, wherein the shafts are connected such that the shafts slide in the bores
10 substantially in unison;

a stop operative to selectively fix the position of the shafts with respect to the frame bracket; and

an opener bracket attached to a lower portion of both shafts and adapted for attachment to a ground-engaging tool.
2. The apparatus of Claim 1 wherein the stop comprises a link member attached to the frame bracket and at least one of the shafts.
3. The apparatus of Claim 2 wherein the link member has a length that is adjustable.
4. The apparatus of Claim 3 wherein the link member comprises an extendible actuator.
5. The apparatus of Claim 3 wherein the link member comprises a screw actuator.
6. The apparatus of Claim 3 wherein the length of the link member can be remotely adjusted.

7. The apparatus of Claim 1 wherein the stop comprises at least one recess in at least one shaft, and a corresponding bracket aperture in the frame bracket, and a pin operative to pass through the bracket aperture into the at least one recess.
8. The apparatus of Claim 7 wherein the recess extends through the at least one shaft.
9. The apparatus of Claim 1 further comprising a furrow opener attached to the opener bracket wherein the furrow opener comprises a ground-engaging furrow opening element attached at a lower portion thereof such that the furrow opening element is substantially oriented at an operating angle with respect to the operating travel direction.
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10. The apparatus of Claim 9 wherein the furrow opener further comprises an opener arm pivotally attached at an upper portion thereof to the opener bracket about a substantially horizontal pivot axis oriented substantially perpendicular to the operating travel direction and wherein the furrow opening element is attached to a lower portion of the opener arm.
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11. The apparatus of Claim 10 further comprising an upper shaft bracket attached to upper portions of both shafts, and a bias element attached to the upper shaft bracket and the opener arm and operative to exert a downward force on the furrow opening element.
12. The apparatus of Claim 9 wherein the furrow opener comprises a rotatable disc.
13. The apparatus of Claim 11 wherein the shafts are configured to deflect as the disc moves further into the ground, thereby reducing the operating angle.
14. The apparatus of Claim 9 wherein the furrow opener comprises a hoe opener.
15. The apparatus of Claim 14 wherein the furrow opener comprises a narrow hoe opener following a rotatable disc.

16. An agricultural implement apparatus adapted to move along the ground in an operating travel direction, the apparatus comprising:
- an implement frame comprising a frame member defining first and second laterally spaced parallel cylindrical bores oriented substantially upright;
- 5 a first cylindrical shaft slidingly engaged in the first bore and a second cylindrical shaft slidingly engaged in the second bore such that the shafts are maintained in a parallel, substantially upright orientation;
- a stop operative to selectively fix the position of the shafts with respect to the frame member;
- 10 a furrow opener; and
- an opener bracket attached to a lower portion of the first shaft and attached to a lower portion of the second shaft such that the first and second shafts slide in the bores in unison, and attached to the furrow opener such that the furrow opener is substantially oriented at an operating angle with respect to the operating travel direction;
- 15 wherein a depth of penetration of the furrow opener into the ground is adjusted by changing the position of the shafts with respect to the frame member.
17. The apparatus of Claim 16 wherein the stop comprises an actuator operative to change the position of the shafts with respect to the frame member.
18. The apparatus of Claim 16 wherein the furrow opener comprises an opener arm pivotally attached at an upper portion thereof to the opener bracket about a substantially horizontal pivot axis oriented substantially perpendicular to the operating travel direction, and attached at a lower portion thereof to a furrow opening element.
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19. The apparatus of Claim 18 further comprising an upper shaft bracket attached to upper portions of both shafts, and a bias element attached to the upper shaft

bracket and the opener arm and operative to exert a downward force on the furrow opening element.

20. The apparatus of Claim 19 wherein the stop comprises a screw actuator attached between the upper shaft bracket and the frame member such that the screw actuator is operative to change the position of the shafts with respect to the frame.
21. The apparatus of Claim 16 wherein the furrow opening element is a rotatable disc.
22. The apparatus of Claim 21 wherein the shafts are configured to deflect as the disc moves further into the ground, thereby reducing the operating angle.